Worksheet 6 Transaction processing **Answers**

Task 1

1. When you place an order over the phone for one or more items, such as a book or clothing, to be delivered to your home, the sales person at the other end of the phone will type details of your order into a database.

   (a) Using an example of an item that you are ordering, list the data that will need to be entered.

   e.g. for a book:

   Title, initials, surname, address, unique book ID (ISBN),

   Where to leave item if no one at home

   Payment method

   Debit/credit card details

   (b) List ways in which the data entry can be made as quick and easy as possible

   A data entry form on screen.

   Tick boxes for Mr, Miss, Ms, etc

   Lookup to see if this is an existing customer, with details already on database

   Lookup the product ID in the database and confirm details

   Postcode entry, automatic filling in of address – just need house/flat number

   Card details – check box for card type

   Once card type is give, e.g. Visa, Mastercard, first 4 digits automatically filled in

2. What methods of data capture would be suitable for entering data from a market research survey conducted in the street?

   A handheld device could display a form and the researcher could enter responses with a touchscreen pen.

   Students should be able to come up with a variety of answers.

3. Processing a transaction often involves several different operations. List the operations that a computer system belonging to a cinema will need to complete to sell a cinema ticket online.

   Record the film title or ID, date and time of performance

   Check seat(s) available

Record number of seats sold in this transaction and adjust number of seats available

Take debit/credit card details

Verify card OK and take payment

Confirm sale and give pickup details to customer

Task 2

4. If you use Cloud storage such as Dropbox, you can specify that certain files can be shared with other named users. You could use it, for example, to work with a friend on a joint project saved in ProjectX.docx..

   Suppose you open ProjectX.docx, and start editing it. While you are doing this, your friend Jo also opens it, makes a few corrections to the joint project and saves it. When you save your version, what happens? Are some of the corrections lost?

   Your corrections will be saved, but in a different document called for example "ProjectX J Brown conflicted copy".

   You will then have to make your corrections again in the document saved by Jo.

5. **ACID** stands for Atomicity, Consistency, Durability, Isolation.

   (i) Explain the purpose of this set of properties.

   To ensure that transactions are processed reliably and that the integrity of the database is maintained under all circumstances.

   (ii) How does ACID ensure that for example a cinema seat is recorded as sold and payment is not taken, owing to a power failure in the middle of the transaction?

   As each part of the transaction is completed it is held in a buffer on disk, until all elements of the transaction are completed. Then the various tables in the database are updated.

   (iii) What is meant by referential integrity? Give an example.

   It means that for example, a the record of a pupil in a school cannot be deleted if they have results on a different table in the database. Likewise, results cannot be recorded for a pupil who does not exist in a Pupil table.

6. Explain how record locking can cause deadlock.

   If user A accesses Record 1, it will be copied to his local storage and locked so that another user cannot access it. If simultaneously, User B accesses Record 2, causing this record to be locked, and needs to update Record 1, they will not be able to complete the transaction. If User A meanwhile needs to access Record 2 to complete their transaction, neither user will be able to complete. Until one of them aborts the transaction, the situation is deadlocked – rather like two streams of traffic trying to cross a narrow bridge from opposite directions.

7. Name and briefly describe two serialisation techniques which ensure that transactions do not overlap in time and ensure that updates are not lost.

   Timestamp ordering – when a database record is read or written, it is given a read or write timestamp. When a user comes to rewrite the record, if the timestamp is not the same, this means another user has opened it, so the database will send an error message to user1.

   Commitment ordering – similar, but also prevents deadlock by taking into account the dependency of one part of a transaction on another.